

APPENDIX D

An Introduction to Display Editing with Vi

An Introduction to Display Editing with Vi[©]

The vi (visual) editor[†] is a display-oriented, interactive text editor. When using vi, the screen of your terminal acts as a window for looking into the file which you are editing. Changes which you make to the file are reflected in what you see. The ex editor supports both command and display-oriented editing. It is line-oriented.

Using vi you can insert new text into the file at any place quite easily. Most of the commands to vi move the cursor around in the file. There are commands to move the cursor forward and backward in units of characters, words, sentences, and paragraphs. A small set of operators, like d for delete and c for change, are combined with the motion commands to form operations, such as "delete a word" or "change a paragraph", in a simple and natural way. This regularity and the mnemonic assignment of commands to keys makes the editor command set easy to remember and use.

The vi editor will work on a large number of display terminals, and new terminals are easily driven after editing a terminal description file. While it is advantageous to have an intelligent terminal which can locally insert and delete lines and characters from the display, the editor functions quite well on dumb terminals over slow telephone lines. The editor makes allowance for the low bandwidth in these situations and uses smaller window sizes and different display updating algorithms to make best use of the limited speed available.

It is also possible to use the command set of the vi editor on hard copy terminals, storage tubes, and "glass tty's" using a one line editing window; thus the vi command set is available on all terminals. The full command set of the more traditional line-oriented editor ex is available within vi. It is quite simple to switch between the two modes of editing.

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[†] The v(ex) editor is based on software developed by The University of California, Berkeley, California, Computer Science Division, Department of Electrical Engineering and Computer Science, and such software is owned and licensed by the Regents of the University of California.

1. Introduction

This document provides an introduction to the *vi* (visual) editor, versions 2 and 3.¹ You should be running *vi* on a file you are familiar with while reading this. Sections 2 through 6 describe the basics for using *vi* and include the display editing features of the *ex* editor. Some topics of special interest are presented in sections 7 and 8, and some details of how the editor functions are saved for section 9 to avoid cluttering the presentation here. A reference manual describing the command-oriented part of the *ex* editor is presented in sections 10 through 18. Sections 10 through 15 contain command, file, and editing mode information for the *ex* editor. Command descriptions, regular expressions, and option descriptions are provided in sections 16, 17, and 18.

At the end of sections 3 and 4 a summary of commands, control characters, and key functions is discussed. The summary gives the name of command, paragraph of reference, and a short description. Table A provides a complete list of characters and their special meanings to the *vi* editor. There is also a quick reference card available which summarizes the commands of *vi* in a very compact format.

In the command examples shown in this part:

- Input which must be typed "as is" will be presented in **bold face**.
- Text which should be replaced with appropriate input will be given in *italics*.

2. Getting Started

2.1 Specifying Terminal Type

Before you can start *vi* you must tell the system what kind of terminal you are using. Here is an incomplete list of terminal type codes. If your terminal does not appear here, consult with one of the staff members on your system to determine the code for your terminal. If your terminal does not have a code, one can be assigned and a description for the terminal created.

CODE	FULL NAME	TYPE
2621	Hewlett-Packard 2621A/P	Intelligent
2645	Hewlett-Packard 264x	Intelligent
act4	Microterm ACT-IV	Dumb
act5	Microterm ACT-V	Dumb
adm3a	Lear Siegler ADM-3A	Dumb
adm31	Lear Siegler ADM-31	Intelligent
c100	Human Design Concept 100	Intelligent
dm1520	Datamedia 1520	Dumb
dm2500	Datamedia 2500	Intelligent
dm3025	Datamedia 3025	Intelligent
fox	Perkin-Elmer Fox	Dumb
h1500	Hazeltine 1500	Intelligent
h19	Heathkit h19	Intelligent
i100	Infoton 100	Intelligent
mime	Imitating a smart act4	Intelligent
t1061	Teleray 1061	Intelligent
vt52	Dec VT-52	Dumb

1. Version 2 is the version of *vi* which runs on the PDP11, hereafter referred to as the V2 editor. Version 3 runs on 32-bit machines, hereafter referred to as the V3 editor.

Suppose for example that you have a Hewlett-Packard HP2621A terminal. The code used by the system for this terminal is '2621'. The command sequence

```
TERM=2621
export TERM
```

would tell the system you have a Hewlett-Packard 2621A/P.

If you want to have your terminal type established automatically when you log in, place the above commands in your *.profile*.

2.2 Editing a File

After telling the system which kind of terminal you have, make a copy of a file you are familiar with and run *vi* on this file with the command

```
$ vi filename
```

Replace *filename* with the name of the copy file just created. The screen should clear and the text of your file appear on the screen. If something else happens perhaps you gave the system an incorrect terminal type code, in which case the editor may have just made a mess out of your screen. This happens when *vi* sends control codes for one kind of terminal to some other kind of terminal. In this case hit the keys *:q* (colon and the *q* key) and then the RETURN key. This should get you back to the command level interpreter. Figure out what you did wrong (ask someone else if necessary) and try again.

Another thing which can go wrong is that you typed the wrong file name and the editor just printed an error diagnostic. In this case you should follow the above procedure for getting out of the editor; then try again, spelling the file name correctly.

If the editor doesn't seem to respond to the commands which you type here, try sending an interrupt to it by hitting the DEL or RUB key on your terminal, and then hitting the *:q* command, again followed by a carriage return.

2.3 Editor Copy in Buffer

The *vi* editor does not directly modify the file which you are editing. Rather, it makes a copy of this file in a place called the *buffer* and remembers the file's name. You do not affect the contents of the file unless and until you write the changes made back into the original file.

2.4 Arrow Keys

The editor command set is independent of the terminal you are using. On most terminals with cursor positioning keys, these keys will also work within the editor. If you don't have cursor positioning keys, or even if you do, you can use the *h j k l* keys as cursor positioning keys (these are labelled with arrows on an *adm3a*).

- *h* moves cursor to the left (like control-h which is a backspace)
- *j* moves cursor down (in the same column)
- *k* moves cursor up (in the same column)
- *l* moves cursor to the right.

Note: On the HP2621 terminal the function keys must be shifted to send to the machine, otherwise they only act locally. Unshifted use will leave the cursor positioned incorrectly.

2.5 Special Characters

Several special characters are very important, so be sure to find them right now. Look on your keyboard for a key labelled ESC or ALT. It should be near the upper left corner of your terminal. Try hitting this key a few times. The editor will ring the bell to indicate that it is in a quiescent state. On smart terminals where it is possible, the editor will quietly flash the screen rather than

ring the bell. Partially formed commands are cancelled with the ESC key. When you insert text in the file, text insertion is ended with the ESC key. This key is a fairly harmless one to hit, so you can just hit it if you don't know what is going on.

The CR or RETURN key is important because it is used to terminate certain commands. It is usually at the right side of the keyboard and is the same command used at the end of each shell command.

Another useful key is the DEL (or RUB key). It generates an interrupt, which tells the editor to stop what it is doing. This is a forceful way of making the editor listen to you, or to return to the quiescent state if you don't know or don't like what is going on. Try hitting the '/' key on your terminal. It is used when you want to specify a search string. The cursor should now be positioned at the bottom line of the terminal after a '/' printed as a prompt. You can get the cursor back to the current position by hitting the DEL or RUB key. Backspacing over the '/' will also cancel the search. From now on we will simply refer to hitting the DEL or RUB key as "sending an interrupt."²

The editor often echoes your commands on the last line of the terminal. If the cursor is on the first position of this last line, then the editor is performing a computation, such as computing a new position in the file after a search or running a command to reformat part of the buffer. When this is happening you can stop the editor by sending an interrupt.

2.6 Leaving the Editor

After you have worked with this introduction for a while, and you wish to do something else, you can give the ZZ command to leave the editor. This writes the contents of the editor buffer (including any changes made) back into the file you are editing and then quits the editor. You can also end an editor session by giving the command :q!CR.³ This is a dangerous but occasionally essential command which ends the editor session and discards all your changes. You need to know about this command in case you change the editor copy of a file you wish only to look at. Be very careful **not** to give this command when you really want to save the changes you have made.

3. Moving Around in the File

3.1 Scrolling and Paging

The editor has a number of commands for moving around in the file. The most useful of these is generated by hitting the control and D keys at the same time, a control-D or '^D'. We will use this two-character notation for referring to these control keys from now on. You may have a key labelled '^' on your terminal. This key will be represented as '^' in this document; the '^' is exclusively used as part of the '^x' notation for control characters. If you don't have a '^' key on your terminal then there is probably a key labelled '^'; these characters are one and the same.

As you know now, if you tried hitting '^D', this command scrolls down in the file. The D thus stands for down. Many editor commands are mnemonic and this makes them much easier to remember. For instance the command to scroll up is '^U'. Many dumb terminals can't scroll up at all, in which case hitting '^U' clears the screen and refreshes it with a line which is farther back in the file at the top.

If you want to see more of the file below where you are, you can hit '^E' to expose one more line at the bottom of the screen, leaving the cursor where it is.⁴ The command '^Y' (which is hopelessly non-mnemonic, but next to '^U' on the keyboard) exposes one more line at the top of the screen.

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2. On some systems, this interrupt feature comes at a price; you cannot type ahead when the editor is computing with the cursor on the bottom line.
 3. All commands which read from the last display line can also be terminated with an ESC as well as a CR character.
 4. Version 3 only.

There are other ways to move around in the file; the keys `^F` and `^B` move forward and backward a page, keeping a couple of lines of continuity between screens so that it is possible to read through a file using these rather than the `^D` and `^U` if you wish.

Notice the difference between scrolling and paging. If you are trying to read the text in a file, hitting `^F` to move forward a page gives you only a little context at which to look back. Scrolling on the other hand gives more context and functions more smoothly. You can continue to read the text while scrolling is taking place.

3.2 Searching, goto, and Previous Context

Another way to position yourself in the file is by giving the editor a string to search for. Type the character `/` followed by a string of characters terminated by a RETURN. The editor will position the cursor at the next occurrence of this string. Then try hitting `n` to go on to the next occurrence of this string. The character `?` will search backward from where you are and is otherwise like `/`.

These searches will normally wrap around the end of the file, and thus find the string even if it is not on a line in the direction you search provided it is anywhere else in the file. You can disable this wrap-around in scans by giving the command:

```
:se nowrapscanCR
or
:se nowsCR
```

If the search string you give the editor is not present in the file, the editor will print a diagnostic on the last line of the screen and the cursor will return to its initial position.

If you wish the search to match only at the beginning of a line, begin the search string with an `|`. To match only at the end of a line, end the search string with a `$`. Thus

```
|firstCR
```

will search for the word 'first' at the beginning of a line, and

```
/last$CR
```

searches for the word 'last' at the end of a line.

Actually, the string you give to search for can be a *regular expression* in the sense of the editors `ex(1)` and `ed(1)`. If you don't wish to learn about this yet, you can disable this more general facility by putting the

```
:se nomagicCR
```

command in EXINIT in your environment.

The command `G`, when preceded by a number will position the cursor at that line in the file. Thus `1G` will move the cursor to the first line of the file. If you give `G` no count, then the cursor moves to the end of the file.

If you are near the end of the file and the last line is not at the bottom of the screen, the editor will place only the character `~` on each remaining line. This indicates that the last line in the file is on the screen; that is, the `~` lines are beyond the end of the file.

You can determine the state of the file you are editing by typing a `^G` command. The editor will show you the name of the file you are editing, the number of the current line, the number of lines in the buffer, and the percentage of the way through the buffer the cursor is located. Try doing this now and remember the number of the line you are on. Give a `G` command to get to the end and then another `G` command to get back where you were.

You can also get back to a previous position by using the command `"` (two back quotes). This is often more convenient than `G` because it requires no advance preparation. Try giving a `G` or a

search with / or ? and then a " to get back where you started. If you accidentally hit n or any command which moves you far away from a context of interest, you can quickly get back by hitting "

3.3 Moving Around on the Screen

Now try just moving the cursor around on the screen. If your terminal has arrow keys (4 or 5 keys with arrows going in each direction) try them and convince yourself that they work.⁵ If you don't have working arrow keys, you can always use h, j, k, and l. Experienced users of vi prefer these keys to arrow keys, because they are usually right underneath their fingers.

Hit the + key. Each time you do, notice that the cursor advances to the next line in the file, at the first non-white position on the line. The - key is like + but goes the other way. These are very common keys for moving the cursor up and down lines in the file. Notice that if the cursor goes off the bottom or top of the screen when using these keys, then the text will scroll down (and up if possible) to bring a line at a time into view. The RETURN key has the same effect as the + key.

The vi editor also has commands to take you to the top, middle and bottom of the screen. The H command will take you to the top line (home) on the screen. Try preceding it with a number as in 3H. This will take you to the third line on the screen. Many vi commands take preceding numbers and do interesting things with them. Try M, which takes you to the middle line on the screen, and L, which takes you to the last line on the screen. The L command also takes counts, the 5L command will take you to the fifth line from the bottom.

There are two control characters that move the cursor up or down a line, but keep it in the same column. The ^N causes the cursor to move to the same column of the next line. To move to the same column of the previous line use the ^P command.

3.4 Moving Within a Line

Now try picking a word on some line on the screen, not the first word on the line. Move the cursor (using RETURN and -) to be on the line where the word is. Try hitting the w key. This will advance the cursor to the next word on the line. Try hitting the b key to back up words in the line. Also try the e key which advances you to the end of the current word rather than to the beginning of the next word. Also try SPACE (the space bar) which moves the cursor right one character and the BS key (backspace or ^H) which moves left one character. The h key works as ^H does and is useful if you don't have a BS key. Also, as noted above, the l key will move the cursor to the right.

If the line has punctuation in it you may have noticed that the w and b keys stop at each group of punctuation. You can also go backward and forward without stopping at punctuation by using W and B rather than the lower case equivalents. Think of these as bigger words. Try these on a few lines with punctuation to see how they differ from the lower case w and b.

The word keys wrap around the end of line, rather than stopping at the end. Try moving to a word on a line below where you are by repeatedly hitting w.

3.5 Summary

BS	3.4	Move cursor one position to the left
SPACE	3.4	Move cursor one position to the right
^B	3.1	Move backward to previous page
^D	3.1	Scroll down in the file

5. On certain terminals using y2 editors, they won't.

^E	3.1	Expose another line at bottom of screen (V3)
^F	3.1	Move forward to next page
^G	3.2	Determine state of file (file name, current line number, number of lines in the buffer, and per-cent way through the buffer)
^H	3.4	Move cursor one space to the left
^N	3.3	Move cursor to next line, same column
^P	3.3	Move cursor to previous line, same column
^U	3.1	Scroll up in the file
^Y	3.1	Expose another line at the top of screen (V3)
+	3.3	Advance cursor to beginning of next line
-	3.3	Move cursor to beginning of previous line
/	3.2	Search forward for a character string
?	3.2	Search backward for a character string
B	3.4	Move cursor backward a word, ignoring punctuation
G	3.2	Move cursor to specified line or to last line if default
H	3.3	Move cursor to top line (home) on screen
M	3.3	Move cursor to middle line on screen
L	3.3	Move cursor to last line on screen
W	3.4	Move cursor forward a word, ignoring punctuation
b	3.4	Move cursor backward a word.
e	3.4	Move cursor to end of current word
h	2.4	Moves cursor to the left
j	2.4	Moves cursor down (in same column)
k	2.4	Moves cursor up (in same column)
l	2.4	Moves cursor to the right
n	3.2	Repeat scan for next instance of / or ? pattern
w	3.4	Move cursor forward a word

3.6 The view Editor

If you want to use the editor to look at a file, rather than to make changes, invoke it as `view` instead of `vi`. This will set the *readonly* option which will prevent you from accidentally overwriting the file.

4. Making Simple Changes

4.1 Inserting

One of the most useful commands is the `i` (insert) command. After you type `i`, everything you type until you hit `ESC` is inserted into the file. Try this now; position yourself on some word in the file and try inserting text before this word. If you are on a dumb terminal it will seem that some of the characters in your line have been overwritten, but they will reappear when you hit `ESC`.

Now try finding a word which can, but does not, end in an 's'. Position yourself at that word and type `e` (move to end of word), `a` (append), and `'sESC'` (terminate the textual insert). This sequence of commands can be used to pluralize a word.

Try inserting and appending a few times to make sure you understand how this works:

- `i` places text to the left of the cursor
- `a` places text to the right of the cursor.

Many related editor commands are invoked by the same letter key and differ only in that one is given by a lower case key and the other is given by an upper case key. In these cases, the upper case key often differs from the lower case key in its sense of direction, with the upper case key working backward and/or up, while the lower case key moves forward and/or down.

It is often the case that you want to add new lines to the file you are editing, before or after some specific line in the file. Find a line where this makes sense and then give the `o` command to create a new line after the line you are on, or the `O` command to create a new line before the line you are on. After you create a new line in this way, the text you type up to an `ESC` is inserted on the new line.

Whenever you are typing in text, you can give many lines of input or just a few characters. To type in more than one line of text, hit a `RETURN` at the middle of your input. A new line will be created for text, and you can continue to type. If you are on a slow and dumb terminal the editor may choose to wait to redraw the tail of the screen, and will let you type over the existing screen lines. This avoids the lengthy delay which would occur if the editor attempted to keep the tail of the screen always up to date. The tail of the screen will be fixed and the missing lines will reappear when you hit `ESC`.

While inserting new text, you can use the characters normally used at the system command level (usually `^H` or `#`) to backspace over the last character typed, and the character used to kill input lines (usually `@`, `^X`, or `^U`) can be used to erase the input you have typed on the current line. In fact, the `^H` (backspace) always works to erase the last input character, regardless of what your erase character is. The `^W` will erase a whole word and leave you after the space following the previous word. It is useful for quickly backing up in an insert. The following conditions should be noted:

- When you backspace during an insertion, the characters you backspace over are not erased; the cursor moves backward, and the characters remain on the display. This is often useful if you are planning to type in something similar. In any case the characters disappear when you hit `ESC`. If you want to get rid of them immediately, hit an `ESC` and then `a` again.
- You cannot erase characters which you did not insert, and you cannot backspace around the end of a line. If you need to back up to the previous line to make a correction, just hit `ESC` and move the cursor back to the previous line. After making the correction you can return to where you were and use the insert or append command again.

4.2 Making Small Corrections

You can make small corrections in existing text quite easily. Find a single character which is wrong or just pick any character. Use the arrow keys to find the character, or get near the character with the word motion keys and then either backspace (hit the `BS` key, `^H`, or just `h`) or `SPACE` (using the space bar) until the cursor is on the character which is wrong. If the character is not needed then hit the `x` key; this deletes the character from the file. It is analogous to the way you `x` out characters when you make mistakes on a typewriter.

If the character is incorrect, you can replace it with the correct character by giving the `rc` command, where `c` is the correct character. If the character which is incorrect should be replaced by more than one character, give the command

sstringESC

which substitutes a string of characters, and ends with ESC. If there are a small number of characters which are wrong you can precede **s** with a count of the number of characters to be replaced. Counts are also useful with **x** to specify the number of characters to be deleted.

4.3 Making Corrections With Operators

You already know almost enough to make changes at a higher level. All you need to know now is that the **d** key acts as a delete operator and the **c** key acts as a change operator.

- The **dw** command deletes a following word.
- The **db** command deletes a preceding word. namely the preceding word.
- The **dSPACE** command deletes a single character, and is equivalent to the **x** command.
- The **cw** command changes the text of a single word. It is followed with replacement text ending with an ESC. Find a word which you can change to another and try this now. Notice that the end of the text to be changed is marked with the character '\$' so that you can see this mark as you are typing in the new text material.

The **.** command repeats the last command which made a change.

4.4 Operating on Lines

It is often the case that you want to operate on lines. Find a line you want to delete and type **dd**, the **d** operator twice. This will delete the line. If you are on a dumb terminal, the editor may erase the line on the screen, replacing it with a line with only an **@** on it. This line does not correspond to any line in your file, but only acts as a place holder. It helps to avoid a lengthy redraw of the rest of the screen which would be necessary to close up the hole created by the deletion on a terminal without a delete line capability.

Try repeating the **c** operator twice (**cc**); this will change a whole line, erasing its previous contents and replacing them with text you type up to an ESC. The command **S** is a convenient synonym for **cc**, by analogy with **s**. Think of **S** as a substitute on lines, while **s** is a substitute on characters.

You can delete or change more than one line by preceding the **dd** or **cc** with a count (**5dd** deletes 5 lines). You can also give a command like **dL** to delete all the lines up to and including the last line on the screen or **d3L** to delete through the third from the bottom line. One subtle point here involves using the **/** (search) after a **d**. This will normally delete characters from the current position to the point of the match. If you desire to delete whole lines including the two points, give the pattern as **/pat/+0**, a line address.

Note: The **ex** editor lets you know when you change a large number of lines so that you can see the extent of the change. It will also always tell you when a change you make affects text which you cannot see.

4.5 Undoing

Suppose the last change you made was incorrect; you could use the insert, delete, and append commands to put the correct material back. However, since it is often the case that we regret a change or make a change incorrectly, the editor provides a **u** (undo) command to reverse the last change you made. Try this a few times, and give it twice in a row to notice that a **u** also undoes a **u**.

The undo command lets you reverse only a single change. After you make a number of changes to a line, you may decide that you would rather have the original state of the line back. The **U** command restores the current line to the state before you started changing it.

You can recover text which you deleted, even if undo will not bring it back; see subpart 7.3 on recovering lost text.

4.6 Summary

SPACE	4.2	Advance cursor one position to the right
^H	4.1	Move cursor one space to the left
^W	4.1	Erase a word during an insert
erase	4.1	Erase a character during an insert (usually ^H or #)
kill	4.1	Kill the insert on this line (usually @ , ^X , or ^U)
.	4.3	Repeat the last change command
O	4.1	Opens and inputs new lines above the current line
S	4.4	Substitute on lines
U	4.5	Undoes the changes made to the current line
a	4.1	Append text after the cursor
c	4.3	Change the specified object (word) to the following text
d	4.3	Delete the specified object (word, space, etc.)
i	4.1	Insert text before the cursor
o	4.1	Opens and inputs new lines below the current line
r	4.2	Replace a character
s	4.2	Replace a character with a string
u	4.5	Undoes the last change
x	4.2	Delete a character
cc	4.4	Change a whole line
dd	4.4	Delete a line

5. Moving About, Rearranging, and Duplicating Text

5.1 Low Level Character Motions

Move the cursor to a line where there is a punctuation or a bracketing character such as a parenthesis or a comma or period. Try the command **fx** where **x** is the character sought. This command finds the next **x** character to the right of the cursor in the current line. Try then hitting a **;**, which finds the next instance of the same character. By using the **f** command and then a sequence of **;**'s, you can often get to a particular place in a line much faster than with a sequence of word motions or SPACES. There is also an **F** command, which is like **f**, but searches backward. The **;** command repeats **F** also.

When operating on the text in a line, it is often desirable to delete characters including the first instance of a character. Try **dfx** for some **x** and notice that the **x** character is deleted. Undo this with **u** and then try **dtx** (the **t** stands for "to") to delete up to the next **x**, but not the **x**. The command **T** is the reverse of **t**.

When working with the text of a single line, an **↑** moves the cursor to the first non-white position on the line, and a **\$** moves it to the end of the line. Thus, **\$a** will append new text at the end of the current line.

Your file may have tab characters (**^I**) in it. These characters are represented as a number of spaces expanding to a tab stop, where tab stops are every eight positions by default. Tab stops are settable by a command of the form

`:se ts = xCR`

where *x* is four to set tab stops every four columns. The tab stop setting has an effect on screen representation within the editor. When the cursor is at a tab, it sits on the last of the several spaces which represent that tab. Try moving the cursor back and forth over tabs so you understand how this works.

On rare occasions, your file may have non-printing characters in it. These characters are displayed in the same way they are represented in this manual; i.e., with a 2-character code, the first character of which is the `^` character. On the screen non-printing characters resemble a `^` character adjacent to another. Spacing or backspacing over the character reveals that the two characters are, like the spaces representing a tab character, a single character.

The editor sometimes discards control characters, depending on the character and the setting of the *beautify* option, if you attempt to insert them in your file. You can get a control character in the file by beginning an insert and then typing a `^V` before the control character. The `^V` quotes the following character causing it to be inserted directly into the file.

5.2 Higher Level Text Objects

In working with a document it is often advantageous to work in terms of sentences, paragraphs, and sections.

- The `(` and `)` operations move to the beginning of the previous and next sentence, respectively. Thus the `d)` command will delete the rest of the current sentence. The `d(` command will:

delete the previous sentence if you are at the beginning of the current sentence

or

delete the current sentence up to where you are if you are not at the beginning of the current sentence.

- A sentence is defined to end at a `.`, `!`, or `?` which is followed by either the end of a line or two spaces. Any number of `)`, `!`, `"`, and `'` closing characters may appear after the `.`, `!`, or `?`, and before the spaces or end of line.
- The `{` and `}` operations move over paragraphs.
- The `[[` and `]]` operations move over sections. They require the operation character to be doubled because they can move the cursor from where it currently is. While it is easy to get back with the `^` command, these commands would still be frustrating if they were easy to hit accidentally.
- A paragraph begins after each empty line and also at each of a set of paragraph macros specified by the pairs of characters in the definition of the string valued option *paragraphs*. The default setting for this option defines the paragraph macros of the `-ms` and `-mm` macro packages, i.e., the `.IP`, `.LP`, `.PP` and `.QP`, `.P` and `.LI` macros. You can easily change or extend this set of macros by assigning a different string to the *paragraphs* option in your `EXINIT`. See subpart 7.2 for details. The `.bp` request is also considered to start a paragraph. Each paragraph boundary is also a sentence boundary. The sentence and paragraph commands can be given counts to operate over groups of sentences and paragraphs.
- Sections in the editor begin after each macro in the *sections* option, normally, `.NH`, `.SH`, `.H` and `.HU`, and each line with a form feed `^L` in the first column. Section boundaries are always line and paragraph boundaries.

Try experimenting with the sentence and paragraph commands until you are sure how they work. If you have a large document, try looking at it using the section commands. Section commands interpret a preceding count as a different window size in which to redraw the screen at the new location, and this window size is the base size for newly drawn windows until another size is specified. This is very useful if you are on a slow terminal and are looking for a particular section. You can give the first section command and a small count to see each successive section heading in a small window.

5.3 Rearranging and Duplicating Text

The editor has a single unnamed buffer where the last deleted or changed text is saved, and a set of named buffers **a-z** which you can use to save copies of text and to move text around in your file and between files.

The **y** operator yanks a copy of the object which follows into the unnamed buffer. If preceded by a buffer name, "xy, where *x* is replaced by a letter **a-z**, it places the text in the named buffer. The text can then be put back in the file with the commands **p** and **P**; the **p** command puts the text after or below the cursor, while **P** puts the text before or above the cursor.

If the text which you yank forms a part of a line or is an object such as a sentence which partially spans more than one line, then when you put the text back, it will be placed after the cursor (or before if you use **P**). If the yanked text forms whole lines, they will be put back as whole lines without changing the current line. In this case, the put acts much like an **o** or **O** command (sub-part 4.1).

Try the **YP** command. This makes a copy of the current line and leaves you on this copy, which is placed before the current line. The command **Y** is a convenient abbreviation for **yy**. The command **Yp** will also make a copy of the current line and place it after the current line. You can give **Y** a count of lines to yank, and thus duplicate several lines; try **3YP**.

To move text within the buffer, you need to delete it in one place and put it back in another. You can precede a delete operation by the name of a buffer in which the text is to be stored as in "**a5dd** deleting 5 lines into the named buffer *a*. You can then move the cursor to the eventual resting place of these lines and do an "**ap** or "**aP** to put them back. In fact, you can switch and edit another file before you put the lines back by giving a command of the form

```
:e nameCR
```

where *name* is the name of the other file you want to edit. You will have to write back the contents of the current editor buffer (or discard them) if you have made changes before the editor will let you switch to the other file. An ordinary delete command saves the text in the unnamed buffer so that an ordinary put can move it elsewhere. However, the unnamed buffer is lost when you change files; so to move text from one file to another, you should use a named buffer.

5.4 Summary

^I	5.1	Tab, add spaces up to next tab stop
^L	5.2	Form feed
^V	5.1	Quote the following character
 	5.1	Move cursor to first non-white position on line
\$	5.1	Move cursor to end of line
)	5.2	Balance of sentence forward
}	5.2	Move cursor forward over paragraph operator
 	5.2	Move cursor forward over section operator
(5.2	Balance of sentence backward
{	5.2	Move cursor backward over paragraph operator
 	5.2	Move cursor backward over section operator
;	5.1	Find next instance of same character found with the fx or Fx
d	5.1	Delete the specified object (character, word, space)

fx	5.1	Find the first <i>x</i> character to right of the cursor
p	5.3	Put text back, after cursor or below current line
u	5.1	Undo the last change
y	5.3	Yank operator, for copies and moves
tx	5.1	To <i>x</i> forward, for operators
Fx	5.1	Find the first <i>x</i> character to left of the cursor
P	5.3	Put text back, before cursor or above current line
Tx	5.1	Up to <i>x</i> backward in line

6. High-Level Commands

6.1 Writing, Quitting, and Editing New Files

So far we have seen how to enter the `vi` editor and to write out our file using either `ZZ` or `:wCR` commands. The first command exits from the editor (writing if changes were made), the second command writes and stays in the editor.

If you have changed the editor copy of the file but do not wish to save your changes either because you messed up the file or decided that the changes are not an improvement, then you can give the command

```
:q!CR
```

to quit from the editor without writing the changes. You can also reedit the same file (start over) by giving the command

```
:e!CR
```

These commands should be used only rarely and with caution, since it is not possible to recover the changes you have made after you discard them in this manner.

You can edit a different file without leaving the editor by giving the command

```
:e nameCR.
```

If you have not written out your file before you try to do this, then the editor will tell you this and delay editing the other file. You can then give the command

```
:wCR
```

(to save your changes) and then the

```
:e nameCR
```

command again or carefully give the command

```
:e! nameCR
```

which edits the other file discarding the changes you have made to the current file. To have the editor automatically save changes, include *set autowrite* in your EXINIT and use `:n` instead of `:e`.

6.2 Escaping to a Shell

You can get to a shell to execute a single command by giving a `vi` command of the form

```
!:cmdCR
```

The system will run the single command (`cmd`); and when finished, the editor will ask you to hit a RETURN to continue. When you have finished looking at the output on the screen, you should hit RETURN; and the editor will clear the screen and redraw it. You can then continue editing. You can also give another `:` command when it asks you for a RETURN; in this case the screen will not be

redrawn.

If you wish to execute more than one command in the shell, then you can give the command

```
:shCR
```

This will give you a new shell. When finished with the shell, end it by typing a `^D`. The editor will clear the screen and continue.

6.3 Marking and Returning

The command `“` returns you to the previous place after a motion of the cursor by a command such as `/`, `?`, or `G`. You can also mark lines in the file with single letter tags and return to these marks later by naming the tags. Try marking the current line with the command `mx`, where you should pick some letter for `x`, such as an `'a'`. Then move the cursor to a different line (any way you like) and hit `'a`. The cursor will return to the place which you marked. Marks last only until you edit another file.

When using operators such as `d` and referring to marked lines, it is often desirable to delete whole lines rather than deleting to the exact position in the line marked by `m`. In this case you can use the form `'x` rather than `'x`. Used without an operator, `'x` will move to the first non-white character of the marked line; similarly, `"` moves to the first non-white character of the line containing the previous context mark `“`.

6.4 Adjusting the Screen

If the screen image is messed up because of a transmission error to your terminal or because some program other than the editor wrote output to your terminal, you can hit a `^L`, the ASCII form-feed character, to cause the screen to be refreshed.

On a dumb terminal, if there are `@` lines in the middle of the screen as a result of line deletion, you may get rid of these lines by typing `^R` to cause the editor to retype the screen, closing up these holes.

If you wish to place a certain line on the screen at the top, middle, or bottom of the screen, you can position the cursor to that line and then give a `z` command. You should follow the `z` command with a RETURN if you want the line to appear at the top of the window, a `.` if you want it at the center, or a `-` if you want it at the bottom.

7. Special Topics

7.1 Editing on Slow Terminals

When you are on a slow terminal, it is important to limit the amount of output which is generated to your screen so that you will not suffer long delays waiting for the screen to be refreshed. We have already pointed out how the editor optimizes the updating of the screen during insertions on dumb terminals to limit the delays and how the editor erases lines to `@` when they are deleted on dumb terminals.

The use of the slow terminal insertion mode is controlled by the *slowopen* option. You can force the editor to use this mode even on faster terminals by giving the command `:se slowCR`. If your system is sluggish, this helps lessen the amount of output coming to your terminal. You can disable this option by `:se noslowCR`.

The editor can simulate an intelligent terminal on a dumb one. Try giving the command `:se redrawCR`. This simulation generates a great deal of output and is generally tolerable only on lightly loaded systems and fast terminals. You can disable this with the `:se noredrawCR` command.

The editor also makes editing more pleasant at low speed by starting editing in a small window and letting the window expand as you edit. This works particularly well on intelligent terminals. The editor can expand the window easily when you insert in the middle of the screen on these terminals. If possible, try the editor on an intelligent terminal to see how this works.

You can control the size of the window which is redrawn each time the screen is cleared by giving window sizes as argument to the commands which cause large screen motions:

```
: / ? [ ] ' ,
```

Thus if you are searching for a particular instance of common string in a file you can precede the first search command by a small number, such as 3, and the editor will draw three line windows around each instance of the string which it locates.

You can easily expand or contract the window and place the current line as you choose by giving a number with the `z` command (after the `z` and before the following RETURN, . or -). Thus the command `z5.` redraws the screen with the current line in the center of a five line window.

Note: The command `5z.` has an entirely different effect placing line 5 in the center of a new window.

If the editor is redrawing or otherwise updating large portions of the display, you can interrupt this updating by hitting a DEL or RUB as usual. If you do this you may partially confuse the editor about what is displayed on the screen. You can still edit the text on the screen if you wish; clear up the confusion by hitting a ^L; or move or search again, ignoring the current state of the display.

See subpart 9.8 on *open* mode for another way to use the `vi` command set on slow terminals.

7.2 Options, Set, and Editor Startup Files

The editor has a set of options, some of which have been mentioned above. The most useful options are given in the following table.

OPTION	DEFAULT	DESCRIPTION
autoindent	noai	Supply indentation automatically
autowrite	noaw	Automatic write before :n, :ta, ^I, and !
ignorecase	noic	Ignore case in searching
lisp	nolisp	() commands deal with S-expressions
list	nolist	Tabs print as ^I; end of lines marked with \$
magic	nomagic	The characters [and * are special in scans
number	nonu	Lines are displayed prefixed with line numbers
paragraphs	para=IPLPPPQbP LI	Macro names which start paragraphs
redraw	nore	Simulate a smart terminal on a dumb one
sections	sect=NHSHH HU	Macro names which start new sections
shiftwidth	sw=8	Shift distance for <, > and input ^D and ^T
showmatch	nosm	Show matching (or { as) or } is typed
slowopen	slow	Postpone display updates during inserts
term	dumb	The kind of terminal you are using

The options are of three kinds: numeric, string, and toggle. You can set numeric and string options by a statement of the form

```
set opt=val
```

and toggle options can be set or unset by statements of one of the forms


```
set opt
set noopt
```

These statements can be placed in your EXINIT in your environment or given while you are running *vi* by preceding them with a `:` and following them with a CR.

You can get a list of all options that you have changed with the command

```
:setCR
```

or the value of a single option by the command

```
:set opt?CR
```

A list of all possible options and their values is generated by

```
:set allCR
```

Set can be abbreviated *se*. Multiple options can be placed on one line, for instance:

```
:se ai aw nuCR
```

Options set by the *set* command last only while you stay in the editor. It is common to want to have certain options set whenever you use the editor. This can be accomplished by creating a list of *ex* commands⁶ which are to be run every time you start up *ex*, *edit*, or *vi*. A typical list includes a *set* command and possibly a few *map* commands (on V3 editors). Since it is advisable to get these commands on one line, they can be separated with the `|` character; for example:

```
set ai aw terse|map @ dd|map # x
```

which establishes the *set* command options *autoindent*, *autowrite*, *terse*, makes `@` delete a line (the first *map*), and makes `#` delete a character (the second *map*) (see subpart 7.9 for a description of the *map* command, which works only in version 3). This string should be placed in the variable EXINIT in your environment. Using the shell, put these lines in the file *.profile* in your home or working directory:

```
EXINIT=set ai aw terse|map @ dd|map # x
export EXINIT
```

Or put the line in the file *exrc* in your home directory.

```
set ai aw terse|map @ dd|map # x
```

Of course, the particulars of the line would depend on which options you wanted to set.

7.3 Recovering Lost Lines

You might have a serious problem if you delete a number of lines and then regret that they were deleted. Despair not, the editor saves the last nine deleted blocks of text in a set of numbered registers 1 through 9. You can get the *n*th previous deleted text back in your file by the command `"np`. The `"` here says that a buffer name is to follow, *n* is the number of the buffer you wish to try (use the number 1 for now), and `p` is the put command which puts text in the buffer after the cursor. If this doesn't bring back the text you wanted, hit `u` to undo this and then `.` (period) to repeat the put command. In general the `.` command will repeat the last change. As a special case, when the last command refers to a numbered text buffer, the `.` command increments the number of the buffer before repeating the command. Thus a sequence of the form

```
. "1pu.u.u
```

6. All commands which start with `:` are *ex* commands.

will, if repeated long enough, show you all the deleted text which has been saved for you. You can omit the `u` commands here to gather up all this text in the buffer or stop after any `.` command to keep just the then-recovered text. The command `P` can also be used rather than `p` to put the recovered text before rather than after the cursor.

7.4 Recovering Lost Files

If the system crashes, you can recover the work you were doing to within a few changes. You will normally receive mail when you next login giving you the name of the file which has been saved for you. You should then change to the directory where you were when the system crashed and give a command of the form:

```
% vi -r name
```

replacing *name* with the name of the file which you were editing. This will recover your work to a point near where you left off.⁷

You can get a listing of the files which are saved for you by giving the command:

```
% vi -r
```

If there is more than one instance of a particular file saved, the editor gives you the newest instance each time you recover it. You can thus get an older saved copy back by first recovering the newer copies.

For this feature to work, `vi` must be correctly installed by a superuser on your system, and the `mail` program must exist to receive mail. The invocation "`vi -r`" will not always list all saved files, but they can be recovered even if they are not listed.

7.5 Continuous Text Input

When you are typing in large amounts of text, it is convenient to have lines broken near the right margin automatically. You can cause this to happen by giving the command

```
:se wm=10CRCR
```

This causes all lines to be broken at a space at least ten columns from the righthand edge of the screen.⁸

If the editor breaks an input line and you wish to put it back together, you can tell it to join the lines with `J`. You can give `J` a count of the number of lines to be joined (as in `3J` to join 3 lines). The editor supplies white space, if appropriate, at the juncture of the joined lines, and leaves the cursor at this white space. You can kill the white space with `x` if you don't want it.

7.6 Features for Editing Programs

The editor has a number of commands for editing programs. The thing that most distinguishes editing of programs from editing of text is the desirability of maintaining an indented structure to the body of the program. The editor has an *autoindent* facility to help generate correctly indented programs.

To enable this facility, you can give the command `:se aiCR`. Now try opening a new line with `o` and then type some characters on the line after a few tabs. If you now start another line, notice

7. In rare cases, some of the lines of the file may be lost. The editor will give you the numbers of these lines and the text of the lines will be replaced by the string 'LOST'. These lines will almost always be among the last few which you changed. You can either choose to discard the changes which you made (if they are easy to remake) or to replace the few lost lines by hand.

8. This feature is not available on some V2 editors. In V2 editors where it is available, the break can only occur to the right of the specified boundary instead of to the left.

that the editor supplies white space at the beginning of the line to line it up with the previous line. You cannot backspace over this indentation, but you can use `^D` key to backtab over the supplied indentation.

Each time you type `^D` you back up one position, normally to an 8-column boundary. This amount is settable; the editor has an option called *shiftwidth* which you can set to change this value. Try giving the command

```
:see sw = 4CR
```

and then experimenting with autoindent again.

For shifting lines in the program left and right, there are operators `<` and `>`. These shift the lines you specify right or left by one *shiftwidth*. Try `<<` and `>>` which shift one line left or right, and `<L` and `>L` shifting the rest of the display left and right.

If you have a complicated expression and wish to see how the parentheses match, put the cursor at a left or right parenthesis and hit `%`. This will show you the matching parenthesis. This works also for braces `()`, and brackets `[]`.

If you are editing C programs, you can use the `[[` and `]]` keys to advance or retreat to a line starting with a `{`, i.e., a function declaration at a time. When `]]` is used with an operator, it stops after a line which starts with `}`; this is sometimes useful with `y]]`.

7.7 Filtering Portions of the Buffer

You can run system commands over portions of the buffer using the operator⁹. You can use this to sort lines in the buffer or to reformat portions of the buffer with a pretty-printer. Try typing in a list of random words, one per line and ending them with a blank line. Back up to the beginning of the list and then give the command `!)sortCR`. This says to sort the next paragraph of material, and the blank line ends a paragraph.

7.8 Commands for Editing LISP⁹

If you are editing a LISP program, you should set the option *lisp* by doing

```
:se lispCR
```

This changes the `(` and `)` commands to move backward and forward over s-expressions. The `{` and `}` commands are like `(` and `)` but don't stop at atoms. These can be used to skip to the next list or through a comment quickly.

The *autoindent* option works differently for LISP supplying indent to align at the first argument to the last open list. If there is no such argument, then the indent is two spaces more than the last level.

There is another option which is useful for typing in LISP, the *showmatch* option. Try setting it with `:se smCR` and then try typing a `(` some words and then a `)`. Notice that the cursor shows the position of the `(` which matches the `)` briefly. This happens only if the matching `(` is on the screen, and the cursor stays there for at most one second.

The editor also has an operator to realign existing lines as though they had been typed in with *lisp* and *autoindent* set. This is the `=` operator. Try the command `=%` at the beginning of a function. This will realign all the lines of the function declaration.

When you are editing LISP, the `[[` and `]]` advance and retreat to lines beginning with a `(` and arc

9. The LISP features are not available on some V2 editors due to memory constraints.

useful for dealing with entire function definitions.

7.9 Macros¹⁰

The vi editor has a macro facility, which lets you set up a macro so that when you enter a single keystroke, the editor will act as though you had entered some longer sequence of keystrokes. You can set up a macro if you find yourself typing the same sequence of commands (keystrokes) repeatedly.

Briefly, there are two types of macros:

- a) One type is where you put the macro body in a buffer register, such as *x*. You can then type `@x` to invoke the macro. The `@` may be followed by another `@` to repeat the last macro.
- b) The other type is where you can use the map command from vi (typically in your EXINIT) with a command of the form:

```
:map lhs rhsCR
```

mapping *lhs* into *rhs*. There are restrictions: *lhs* should be one keystroke (either one character or one function key) since it must be entered within 1 second (unless *notimeout* is set, in which case you can type it as slowly as you wish, and vi will wait for you to finish it before it echoes anything). The *lhs* can be no longer than ten characters, the *rhs* no longer than 100. To get a space, tab or newline into *lhs* or *rhs* you should escape them with a `^V` (it may be necessary to double the `^V` if the map command is given inside vi rather than in *ex*). Spaces and tabs inside the *rhs* need not be escaped.

Thus to make the *q* key write and exit the editor, you can give the command

```
:map q :wq^V^VCR CR
```

which means that whenever you type *q*, it will be as though you had typed the four characters `:wqCR`. A `^V` is needed because without it the CR would end the `:` command rather than becoming part of the *map* definition. There are two `^V`'s because from within vi, two `^V`'s must be typed to get on. The first CR is part of the *rhs*, the second terminates the `:` command.

Macros can be deleted with

```
unmap lhs
```

If the *lhs* of a macro is `"#0"` through `"#9"`, this maps the particular function key instead of the 2-character `"#"` sequence. So that terminals without function keys can access such definitions, the form `"#x"` will mean function key *x* on all terminals (and need not be typed within 1 second). The character `"#"` can be changed by using a macro in the usual way:

```
:map ^V^V^I #
```

to use `tab`, for example. This will not affect the *map* command, which still uses `#`, but just the invocation from visual mode.

The undo command reverses an entire macro call as a unit if it made any changes.

Placing a `"!`" after the word *map* causes the mapping to apply to input mode rather than command mode. Thus, to arrange for `^T` to be the same as four spaces in input mode, you can type:

10. The macro feature is available only in version 3 editors.

```
:map ^T ^V^V^V
```

where **V** is a blank. The **^V** is necessary to prevent the blanks from being taken as white space between the *lhs* and *rhs*.

8. Word Abbreviations¹¹

A feature similar to macros in input mode is word abbreviation. This allows you to type a short word and have it expanded into a longer word or words. The commands are

```
:abbreviate
and
:unabbreviate
```

or

```
:ab
and
:una
```

and have the same syntax as **:map**. For example:

```
:ab eecs Electrical Engineering and Computer Sciences
```

causes the word 'eecs' to always be changed into the phrase 'Electrical Engineering and Computer Sciences'. Word abbreviation is different from macros in that only whole words are affected. If 'eecs' were typed as part of a larger word, it would be left alone. Also, the partial word is echoed as it is typed. There is no need for an abbreviation to be a single keystroke as it should be with a macro.

8.1 Abbreviations

The editor has a number of short commands abbreviate longer commands which we have introduced here. You can find these commands easily on the quick reference card. They often save a bit of typing and you can learn them as convenient.

9. Additional Information

9.1 Line Representation in the Display

The editor folds long logical lines onto many physical lines in the display. Commands which advance lines advance logical lines and will skip over all the segments of a line in one motion. The **|** command moves the cursor to a specific column and may be useful for getting near the middle of a long line to split it in half. Try **80|** on a line which is more than 80 columns long.¹²

The editor puts only full lines on the display; if there is not enough room on the display to fit a logical line, the editor leaves the physical line empty, placing only an **@** on the line as a place holder. When you delete lines on a dumb terminal, the editor will often clear just the lines to **@** to save time (rather than rewriting the rest of the screen). You can always maximize the information on the screen by giving the **^R** command.

If you wish, you can have the editor place line numbers before each line on the display. Give the command

11. Version 3 only.

12. You can make long lines very easily by using **J** to join together short lines.

:se nuCR

to enable this, and the command

:se nonuCR

to turn it off. You can have tabs represented as `^I` and the ends of lines indicated with `^S` by giving the command

:se listCR

The following command removes the display of tabs and ends of lines:

:se nolistCR

Lines consisting of only the `^~` character are displayed when the last line in the file is in the middle of the screen. These represent physical lines which are past the logical end of file.

9.2 Counts

Most `vi` commands will use a preceding count to affect their behavior in some way. The following table gives the common ways in which the counts are used:

new window size	:	/	?		'
scroll amount		^D	^U		
line/column number		z	G		
repeat effect					most of the rest

The editor maintains a notion of the current default window size. On terminals which run at speeds greater than 1200 baud the editor uses the full terminal screen. On terminals which are slower than 1200 baud (most dial-up lines are in this group) the editor uses 8 lines as the default window size. At 1200 baud the default is 16 lines.

This size is the size used when the editor clears and refills the screen after a search or other motion moves far from the edge of the current window. Commands which take a new window size as count - all too often cause the screen to be redrawn. If you anticipate this, but do not need as large a window as you are currently using, you may wish to change the screen size by specifying the new size before these commands. In any case, the number of lines used on the screen will expand if you move off the top with a `-` or similar command, or off the bottom with a command such as `RETURN` or `^D`. The window will revert to the last specified size the next time it is cleared and refilled.¹³

The scroll commands `^D` and `^U` likewise remember the amount of scroll last specified, using half the basic window size initially. The simple insert commands use a count to specify a repetition of the inserted text. Thus

10a +----ESC

will insert a grid-like string of text. A few commands also use a preceding count as a line or column number.

Except for a few commands which ignore any counts (such as `^R`), the rest of the editor commands use a count to indicate a simple repetition of their effect. Thus `5w` advances five words on the current line, while `5RETURN` advances five lines. A very useful instance of a count as a repetition is a count given to the `.` command, which repeats the last changing command. If you do `dw` and the `3.`, you will delete first one and then three words. You can then delete two more words with the `2.` command.

¹³. But not by a `^L` which just redraws the screen as it is.

9.3 More File Manipulation Commands

The following table lists the file manipulation commands which you can use when you are in `vi`.

<code>:w</code>	write back changes
<code>:wq</code>	write and quit
<code>:x</code>	write (if necessary) and quit (same as <code>ZZ</code>).
<code>:e name</code>	edit file <i>name</i>
<code>:e!</code>	re-edit, discarding changes
<code>:e + name</code>	edit, starting at end
<code>:e +n</code>	edit, starting at line <i>n</i>
<code>:e #</code>	edit alternate file
<code>:w name</code>	write file <i>name</i>
<code>:w! name</code>	overwrite file <i>name</i>
<code>:x,yw name</code>	write lines <i>x</i> through <i>y</i> to <i>name</i>
<code>:r name</code>	read file <i>name</i> into buffer
<code>:r !cmd</code>	read output of <i>cmd</i> into buffer
<code>:n</code>	edit next file in argument list
<code>:n!</code>	edit next file, discarding changes to current
<code>:n args</code>	specify new argument list
<code>:ta tag</code>	edit file containing tag <i>tag</i> , at <i>tag</i>

All of these commands are followed by a CR or ESC. The most basic commands are `:w` and `:e`. A normal editing session on a single file will end with a `ZZ` command. If you are editing for a long period of time you can give `:w` commands occasionally after major amounts of editing, and then finish with a `ZZ`. When you edit more than one file, you can finish with one with a `:w` and start editing a new file by giving a `:e` command, or set *autowrite* and use `:n <file>`.

If you make changes to the editor copy of a file, but do not wish to write them back, then you must give an `!` after the command you would otherwise use; this forces the editor to discard any changes you have made. **Use this carefully.**

The `:e` command can be given a `+` argument to start at the end of the file, or a `+n` argument to start at line *n*. In actuality, *n* may be any editor command not containing a space, usually a scan like `+/pat` or `+?pat`. In forming new names to the `e` command, you can use the character `%` which is replaced by the current file name, or the character `#` which is replaced by the alternate file name. The alternate file name is generally the last name you typed other than the current file. Thus, if you try to do a `:e` and get a diagnostic that you have not written into the file, you can give a `:w` command and then a `:e #` command to redo the previous `:e`.

You can write part of the buffer to a file by finding the lines that bound the range to be written using `^G`, to obtain the line numbers, and giving these numbers after the `:` and before the `w`, separated by `,`'s. You can also mark these lines with `m` and then use an address of the form `'x,y` on the `w` command.

You can read another file into the buffer after the current line by using the `:r` command. You can similarly read in the output from a command, just use the `:r !cmd` instead of a file name.

If you wish to edit a set of files in succession, you can give all the names on the command line, and then edit each one in turn using the command `:n`. It is also possible to respecify the list of files to be edited by giving the `:n` command a list of file names, or a pattern to be expanded as you would have given it on the initial `vi` command.

If you are editing large programs, you will find the `:ta` command very useful. It utilizes a data base of function names and their locations, which can be created by programs such as `ctags`, to quickly find a function whose name you give. If the `:ta` command will require the editor to switch files, then you must `:w` or abandon any changes before switching. You can repeat the `:ta` command without any arguments to look for the same tag again. (The tag feature is not available in some `v2` editors.)

9.4 More About Searching for Strings

When you are searching for strings in the file with / or ?, the editor normally places you at the next or previous occurrence of the string. If you are using an operator such as d, c, or y, you may well wish to affect lines up to the line before the line containing the pattern. You can give a search of the form

```
/pat/ -n
```

to refer to the *n*'th line before the next line containing *pat*, or you can use + instead of - to refer to the lines after the one containing *pat*. If you do not give a line offset, the editor will affect characters up to the match place rather than whole lines; thus use "+0" to affect to the line which matches.

You can have the editor ignore the case of words in the searches it does by giving the command

```
:se icCR
```

The command

```
:se noicCR
```

turns this off.

Strings given to searches may actually be regular expressions. If you do not want or need this facility, you should

```
set nomagic
```

in your EXINIT. In this case, only the characters † and \$ are special in patterns. The character \ is also then special (as it is most everywhere in the system), and may be used to get at the extended pattern-matching facility. It is also necessary to use a \ before a / in a forward scan or a ? in a backward scan. The following table gives the extended forms when **magic** is set.

†	at beginning of pattern, matches beginning of line
\$	at end of pattern, matches end of line
.	matches any character
\<	matches the beginning of a word
\>	matches the end of a word
[<i>str</i>]	matches any single character in <i>str</i>
[† <i>str</i>]	matches any single character not in <i>str</i>
[<i>x-y</i>]	matches any character between <i>x</i> and <i>y</i>
*	matches any number of the preceding pattern

If you use **nomagic** mode, then the . [and * primitives are given with a preceding \.

9.5 More About Input Mode

There are a number of characters which you can use to make corrections during input mode. These are summarized in the following table.

^H	deletes the last input character
^W	deletes the last input word
erase	erase character, same as ^H
kill	kill character, deletes the input on this line
\	escapes a following ^H, erase, and kill
ESC	ends an insertion
DEL	interrupt an insertion, terminating it abnormally
CR	starts a new line
^D	backtabs over <i>autoindent</i>
0^D	kills all the <i>autoindent</i>
†^D	same as 0^D, but restores indent next line

`^V` quotes the next non-printing character into the file

The most usual way of making corrections to input is by typing `^H` to correct a single character, or by typing one or more `^W`'s to back over incorrect words. If you use `#` as your erase character in the normal system, it will work like `^H`.

Your system kill character, normally `@`, `^X`, or `^U` will erase all the input you have given on the current line. In general, you can neither erase input back around a line boundary nor can you erase characters which you did not insert with this insertion command. To make corrections on the previous line after a new line has been started you can hit `ESC` to end the insertion, move over and make the correction, and then return to where you were to continue. The command `A` which appends at the end of the current line is often useful for continuing.

If you wish to type in your erase or kill character (such as `#` or `@`) then you must precede it with a `\`, just as you would do at the normal system command level. A more general way of typing non-printing characters into the file is to precede them with a `^V`. The `^V` echoes as a `↑` character on which the cursor rests. This indicates that the editor expects you to type a control character. In fact you may type any character and it will be inserted into the file at that point.

Note: This is not quite true. The implementation of the editor does not allow the `NULL` (`^@`) character to appear in files. Also the `LF` (line feed or `^J`) character is used by the editor to separate lines in the file, so it cannot appear in the middle of a line. You can insert any other character, however, if you wait for the editor to echo the `↑` before you type the character. In fact, the editor will treat a following letter as a request for the corresponding control character. This is the only way to type `^S` or `^Q`, since the system normally uses them to suspend and resume output and never gives them to the editor to process.

If you are using *autoindent* you can backtab over the indent which it supplies by typing a `^D`. This backs up to a *shiftwidth* boundary. This works only immediately after the supplied *autoindent*.

When you are using *autoindent* you may wish to place a label at the left margin of a line. The way to do this easily is to type `↑` and then `^D`. The editor will move the cursor to the left margin for one line and restore the previous indent on the next. You can also type a `0` followed immediately by a `^D` if you wish to kill all the indent and not have it come back on the next line.

9.6 Upper Case Only Terminals

If your terminal has only upper case, you can still use *vi* by using the normal system convention for typing on such a terminal. Characters which you normally type are converted to lower case, and you can type upper case letters by preceding them with a `\`. The characters

```
{ } | ^
```

are not available on such terminals, but you can escape them as

```
\{ \} \^
```

These characters are represented on the display in the same way they are typed (the `\` character you give will not echo until you type another key).

9.7 Relation Between *vi* and *ex* Editors

The *vi* editor is actually one mode of editing within the editor *ex*. When you are running *vi* you can escape to the line-oriented editor of *ex* by giving the command `Q`. All of the `:` commands which were introduced above are available in *ex*. Likewise, most *ex* commands can be invoked from *vi* using `:`. Just give them without the `:` and follow them with a `CR`.

In rare instances, an internal error may occur in *vi*. In this case you will get a diagnostic and be left in the command mode of *ex*. You can then save your work and quit if you wish by giving a command `x` after the `:` which *ex* prompts you with, or you can reenter *vi* by giving *ex* a *vi* command.

There are a number of things which you can do more easily in *ex* than in *vi*. Systematic changes in line-oriented material are particularly easy. You can read the advanced editing documents for the editor *ed* to find out a lot more about this style of editing. Experienced users often mix their use of *ex* command mode and *vi* command mode to speed the work they are doing.

9.8 Open Mode: *vi* on Hard Copy Terminals and Glass tty's¹⁴

If you are on a hard copy terminal or a terminal which does not have a cursor which can move off the bottom line, you can still use the command set of *vi*, but in a different mode. When you give a *vi* command, the editor will tell you that it is using *open* mode. This name comes from the *open* command in *ex*, which is used to get into the same mode.

The only difference between *visual* mode and *open* mode is the way in which the text is displayed.

In *open* mode the editor uses a single line window into the file, and moving backward and forward in the file causes new lines to be displayed, always below the current line. Two commands of *vi* work differently in *open* mode: *z* and *^R*. The *z* command does not take parameters, but rather draws a window of context around the current line and then returns to the current line.

If you are on a hard copy terminal, the *^R* command will retype the current line. On such terminals, the editor normally uses two lines to represent the current line. The first line is a copy of the line as you started to edit it, and you work on the line below this line. When you delete characters, the editor types a number of **'s to show you the characters which are deleted. The editor also reprints the current line soon after such changes so that you can see what the line looks like again.

It is sometimes useful to use this mode on very slow terminals which can support *vi* in the full screen mode. You can do this by entering *ex* and using an *open* command.

14. Not available in all V2 editors due to memory constraints.

TABLE A
CHARACTER FUNCTIONS SUMMARY

This table shows the uses that the vi editor makes of each character. Characters are presented in their order in the ASCII character set: control characters first, most special characters, digits, upper case characters, and then lower case characters.

Each character is defined with a meaning it has as a command and any meaning it has during an insert. If it has meaning only as a command, then only this is discussed. Numbers in parentheses indicate where the character is discussed (an 'f' after the section number means that the character is mentioned in a footnote).

- ^@** Not a command character.
If typed as the first character of an insertion it is replaced with the last text inserted, and the insert terminates. Only 128 characters are saved from the last insert; if more characters have been inserted the mechanism is not available. A ^@ cannot be part of the file due to the editor implementation.
(8.5f)
- ^A** Unused.
- ^B** Backward window. A count specifies repetition. Two lines of continuity are kept if possible.
(3.1, 7.1, 8.2)
- ^C** Unused.
- ^D** As a command, it scrolls down a half-window of text. A count gives the number of (logical) lines to scroll, and is remembered for future ^D and ^U commands.
(3.1, 8.2)
During an insert, it backtabs over *autoindent* white space at the beginning of a line. This white space cannot be backspaced over.
(7.6, 8.5)
- ^E** Exposes one more line below the current screen in the file, leaving the cursor where it is if possible. (Version 3 only)
- ^F** Forward window. A count specifies repetition. Two lines of continuity are kept if possible
(3.1, 7.1, 8.2)
- ^G** Equivalent to :fCR, printing the current file name, whether it has been modified, the current line number, the number of lines in the file, and the percent of the way through the file.
- ^H (BS)** Same as **left arrow** (see **h**). During an insert, it eliminates the last input character, backing over it but not erasing it. The character remains so you can see what you typed if you wish to type something slightly different.
(4.1, 8.5)
- ^I (TAB)** Not a command character.
When inserted it prints as some number of spaces. When the cursor is at a tab character it rests at the last of the spaces which represent the tab. The spacing of tab stops is controlled by the *tabstop* option.
(5.1, 7.6)
- ^J (LF)** **Down arrow**. It moves the cursor one line down in the same column. If the position does not exist, vi comes as close as possible to the same column. Synonyms include **j** and

- ^N.**
- ^K** Unused.
- ^L** The ASCII form feed character, which causes the screen to be cleared and redrawn. It is useful after a transmission error, if characters typed by a program other than the editor scramble the screen, or after output is stopped by an interrupt.
(6.4, 8.2f)
- ^M (CR)** A carriage return advances to the next line, to the first nonwhite position in the line. Given a count, it advances that many lines.
(2.3)
During an insert, a CR causes the insert to continue onto another line.
(4.1)
- ^N** **Down arrow.** It moves the cursor one line down in the same column. If the position does not exist, vi comes as close as possible to the same column. Synonyms include **j** and **^J**.
- ^O** Unused.
- ^P** **Up arrow.** It moves the cursor one line up. A synonym is **k**.
- ^Q** Not a command character.
In input mode, **^Q** quotes the next character, the same as **^V**, except that some teletype drivers will eat the **^Q** so that the editor never sees it.
- ^R** Redraws the current screen, eliminating logical lines not corresponding to physical lines (lines with only a single @ character on them). On hard-copy terminals in *open* mode, retypes the current line.
(6.4, 8.2, 8.8)
- ^S** Unused.
Some teletype drivers use **^S** to suspend output until **^Q** is invoked.
- ^T** Not a command character.
During an insert, with *autoindent* set and at the beginning of the line, it inserts *shiftwidth* white space.
- ^U** Scrolls the screen up, inverting **^D** which scrolls down. A count gives the number of (logical) lines to scroll, and is remembered for future **^D** and **^U** commands. The previous scroll amount is common to both. On a dumb terminal, **^U** will often necessitate clearing and redrawing the screen further back in the file.
(3.1, 8.2)
- ^V** Not a command character.
In input mode, it quotes the next character so that it is possible to insert non-printing and special characters into the file.
(5.2, 8.5)
- ^W** Not a command character.
During an insert, it backs up as **b** would in command mode; the deleted characters remain on the display (see **^H**).
(8.5)
- ^X** Unused.
- ^Y** Exposes one more line above the current screen, leaving the cursor where it is if possible. There is no mnemonic value for this key; however, it is next to **^U** (which scrolls up a bunch) (Version 3 only).

- ^Z** Unused.
- ^I (ESC)** Cancels a partially formed command (such as a **z** when no following character has yet been given), terminates inputs on the last line (read by commands such as **:**, **/**, and **?**), and ends insertions of new text into the buffer. If an ESC is given when quiescent in command state, the editor rings the bell or flashes the screen. You can thus hit ESC if you don't know what is happening until the editor rings the bell. If you do not know if you are in insert mode, you can type **ESCa** and then the material to be input; the material will be inserted correctly whether or not you were in insert mode when you started.
(2.4, 4.1, 8.5)
- ^\
^_** Unused.
- ^I** Searches for the word which is after the cursor as a tag. It is equivalent to typing **:ta**, this word, and then a CR.
(8.3)
- ^J** Equivalent to **:e #CR**, returning to the previous position in the last edited file, or editing a file which you specified if you got a "No write since last change" diagnostic and do not want to have to type the file name again. You have to do a **:w** before **^J** will work in this case. If you do not wish to write the file you should do **:e! #CR** instead.
(7.3)
- ^
^_** Unused.
Reserved as the command character for the Tektronix 4025 and 4027 terminal.
- SPACE** Same as **right arrow** (see **I**).
- !** An operator, which processes lines from the buffer with reformatting commands. Follow **!** with the object to be processed, and then the command name terminated by CR. Doubling **!** and preceding it by a count causes count lines to be filtered; otherwise, the count is passed on to the object after the **!**. Thus **2!}fmtCR** reformats the next two paragraphs by running them through the program *fmt*.
(7.7, 8.3)
To read a file or the output of a command into the buffer use **:r**.
(8.3)
To simply execute a command use **!:**.
(8.3)
- "** Precedes a named buffer specification. There are named buffers **1-9** used for saving deleted text and named buffers **a-z** into which you can place text.
(5.3, 7.3)
- #** The macro character which, when followed by a number, will substitute for a function key on terminals without function keys. In input mode, if this is your erase character, it will delete the last character you typed in input mode, and must be preceded with a **** to insert it, since it normally backs over the last input character you gave.
(6.9)
- \$** Moves to the end of the current line. If the **:se listCR** command is used, then the end of each line will be shown by printing a **\$** after the end of the displayed text in the line. When a count is used, the cursor advances to the end of the line following the count. For example **2\$** advances the cursor to the end of the following line.
- %** Moves to the parenthesis(**()**) or brace (**{}**) which balances the parenthesis or brace at the current cursor position.
- &** A synonym for **:&CR**, analogous to the **ex &** command.

- ' When followed by a `'`, the cursor returns to the previous context at the beginning of a line. The previous context is set whenever the current line is moved in a nonrelative way. When followed by a letter (a-z), it returns to the line which was marked with this letter with an `m` command, at the first nonwhite character in the line. When used with an operator such as `d`, the operation takes place over complete lines; if you use `'`, the operation takes place from the exact marked place to the current cursor position within the line.
(3.2, 6.3)
 - (Retreats to the beginning of a sentence, or to the beginning of a LISP s-expression if the *lisp* option is set. A sentence ends at a `.`, `!`, or `?` which is followed by either the end of a line or by two spaces. Any number of closing characters `()`, `{}`, `["]`, and `'` may appear after the `.`, `!`, or `?`, and before the spaces or end of line. Sentences also begin at paragraph and section boundaries (see `{` and `||`). A count advances that many sentences
(5.2, 7.8)
 -) Advances to the beginning of a sentence. A count repeats the effect. See `(` for the definition of a sentence.
(5.2, 7.8)
 - * Unused.
 - + Same as `CR` when used as a command.
 - , Reverse of the last `f`, `F`, `t`, or `T` command, looking the other way in the current line. Especially useful after hitting too many `;` characters. A count repeats the search.
 - Retreats to the previous line at the first nonwhite character. This is the inverse of `+` and `RETURN`. If the line moved to is not on the screen, the screen is scrolled, or cleared and redrawn. If a large amount of scrolling would be required the screen is also cleared and redrawn, with the current line at the center.
(3.3)
 - . Repeats the last command which changed the buffer. Especially useful when deleting words or lines; you can delete some words/lines and then hit `.` to delete more and more words/lines. Given a count, it passes it on to the command being repeated. Thus after a `2dw`, a `3.` deletes three words.
(4.3, 7.3, 8.2, 8.4)
 - / Reads a string from the last line on the screen, and scans forward for the next occurrence of this string. The search begins when you hit `CR` to terminate the pattern; the cursor moves to the beginning of the last line to indicate that the search is in progress; the search may be terminated with a `DEL` or `RUB`, or by backspacing when at the beginning of the bottom line, returning the cursor to its initial position. Searches normally wrap end-around to find a string anywhere in the buffer.
- When used with an operator, the enclosed region is normally affected. By mentioning an offset from the line matched by the pattern, you can force whole lines to be affected. To do this, give a pattern with a closing `/` and then an offset `+n` or `-n`.
- To include the `/` character in the search string, you must escape it with a preceding `\`. A `↑` at the beginning of the pattern forces the match to occur at the beginning of a line only; this speeds the search. A `$` at the end of the pattern forces the match to occur at the end of a line only. More extended pattern matching is available (see section 8.4). Unless you set `nomagic` in your `.exc` file you will have to precede the characters `.`, `!`, `*`, and `~` in the search pattern with a `\` to get them to work as you would expect.
(2.4, 3.2, 7.1, 8.2, 8.4)

- 0** Moves to the first character on the current line. Also used, when forming numbers, after an initial 1-9.
- 1-9** Used to form numeric arguments to commands. (3.3, 8.2)
- :** A prefix to a set of commands for file and option manipulation and escapes to the system. Input is given on the bottom line and terminated with a CR, and the command is then executed. You can return to where you were by hitting DEL or RUB if you hit : accidentally. (7.2 and 8.3)
- ;** Repeats the last single character find which used **f**, **F**, **t**, or **T**. A count iterates the basic scan. (5.1)
- <** An operator which shifts lines left one *shiftwidth*, normally 8 spaces. Like all operators, it affects lines when repeated, as in **<<**. Counts are passed through to the basic object, thus **3<<** shifts three lines. (7.6., 8.2)
- =** Reindents lines for LISP, as though they were typed in with *lisp* and *autoindent* set. (7.8)
- >** An operator which shifts lines right one *shiftwidth*, normally 8 spaces. Affects lines when repeated as in **>>**. Counts repeat the basic object. (7.6, 8.2)
- ?** Scans backwards, the opposite of **/**. See the **/** description for details on scanning. (3.2, 7.1, 8.4)
- @** A macro character. (7.9)
If this is your kill character, you must escape it with a **** to type it in during input mode, as it normally backs over the input you have given on the current line. (4.1, 4.4, 8.5)
- A** Appends at the end of line, a synonym for **\$a**. (8.2)
- B** Backs up a word, where words are composed of nonblank sequences, placing the cursor at the beginning of the word. A count repeats the effect. (3.4)
- C** Changes the rest of the text on the current line; a synonym for **c\$**.
- D** Deletes the rest of the text on the current line; a synonym for **d\$**.
- E** Moves forward to the end of a word, defined as blanks and nonblanks, like **B** and **W**. A count repeats the effect.
- F** Finds a single following character, backwards in the current line. A count repeats this search that many times. (5.1)
- G** Goes to the line number given as preceding argument, or the end of the file if no preceding count is given. The screen is redrawn with the new current line in the center if necessary. (8.2)
- H** **Home arrow.** Homes the cursor to the top line on the screen. If a count is given, then the cursor is moved to the count's line on the screen. In any case the cursor is moved to the first nonwhite character on the line. If used as the target of an operator, full lines

are affected.
(3.3, 4.2)

- I** Inserts at the beginning of a line; a synonym for `fi`.
- J** Joins lines together, supplying appropriate white space: one space between words, two spaces after a `,` and no spaces at all if the first character of the joined on line is `).` A count causes that many lines to be joined rather than the default two.
(7.5, 8.1f)
- K** Unused.
- L** Moves the cursor to the first nonwhite character of the last line on the screen. With a line count number, moves the cursor to the first nonwhite character of the indicated line from the bottom. Operators affect whole lines when used with `L`.
(3.3)
- M** Moves the cursor to the middle line on the screen, at the first nonwhite position on the line.
(3.3)
- N** Scans for the next match of the last pattern given to `/` or `?`, but in the reverse direction; this is the reverse of `n`.
- O** Opens a new line above the current line and inputs text there up to an ESC. A count can be used on dumb terminals to specify a number of lines to be opened; this is generally obsolete, as the *slowopen* option works better.
(4.1)
- P** Puts the last deleted text back before/above the cursor. The text goes back as whole lines above the cursor if it was deleted as whole lines; otherwise, the text is inserted between the characters before and at the cursor. The `P` character may be preceded by a named buffer specification `"x` to retrieve the contents of the buffer; buffers `1-9` contain deleted material, buffers `a-z` are available for general use.
(7.3)
- Q** Quits from `vi` to `ex` command mode. In this mode, whole lines form commands, ending with a RETURN. You can give all the `:` commands; the editor supplies the `:` as a prompt.
(8.7)
- R** Replaces characters on the screen with characters you type (overlay fashion). Terminates with an ESC.
- S** Changes whole lines; a synonym for `cc`. A count substitutes for that many lines. The lines are saved in the numeric buffers and erased on the screen before the substitution begins.
- T** Takes a single following character, locates the character before the cursor in the current line, and places the cursor just after that character. A count repeats the effect. Most useful with operators such as `d`.
(5.1)
- U** Restores the current line to its state before you started changing it.
(4.5)
- V** Unused.
- W** Moves forward to the beginning of a word in the current line, where words are defined as sequences of blank/nonblank characters. A count repeats the effect.
(3.4)

- X** Deletes the character before the cursor. A count repeats the effect, but only characters on the current line are deleted.
- Y** Yanks a copy of the current line into the unnamed buffer, to be put back by a later **p** or **P**; a synonym for **yy**. A count yanks that many lines. May be preceded by a buffer name to put lines in that buffer.
(8.4)
- ZZ** Exits the editor (same as **:xCR**). If any changes have been made, the buffer is written out to the current file. Then the editor quits.
- ||** Backs up the previous section boundary. A section begins at each macro in the *sections* options, normally a **NH** or **.SH** and also at lines which start with a form feed **^L**. Lines beginning with **{** also stop **||**; this makes it useful for looking backward, a function at a time, in **C** programs. If the option *lisp* is set, stops at each **(** at the beginning of a line, and is thus useful for moving backwards at the top level LISP objects.
(5.2, 7.1, 7.6, 8.2)
- ** Unused.
- ||** Forward to a section boundary, see **||** for a definition.
(5.2, 7.1, 7.6, 8.2)
- ↑** Moves to the first nonwhite position on the current line.
(5.4)
- _** Unused
- '** When followed by a **'** returns to the previous context. The previous context is set whenever the current line is moved in a nonrelative way. When followed by a letter **a-z**, returns to the position which was marked with this letter with an **m** command. When used with an operator such as **d**, the operation takes place from the exact marked place to the current position within the line; if you use **'**, the operation takes place over complete lines.
(3.2, 6.3)
- a** Appends arbitrary text after the current cursor position; the insert can continue onto multiple lines by using **RETURN** within the insert. A count causes the inserted text to be replicated, but only if the inserted text is all on one line. The insertion terminates with an **ESC**.
(4.1, 8.2)
- b** Backs up to the beginning of a word in the current line. A word is a sequence of alphanumerics, or a sequence of special characters. A count repeats the effect.
(3.4)
- c** An operator which changes the following object, replacing it with the following input text up to an **ESC**. If more than part of a single line is affected, the text which is changed away is saved in the numeric named buffers. If only part of the current line is affected, the last character to be changed away is marked with a **\$**. A count causes that many objects to be affected, thus both **3c)** and **c3)** change the following three sentences.
(8.4)
- d** An operator which deletes the following object. If more than part of a line is affected, the text is saved in the numeric buffers. A count causes that many objects to be affected; thus **3dw** is the same as **d3w**.
(4.3, 4.4, 5.1, 8.4)
- e** Advances to the end of the next word, defined as for **b** and **w**. A count repeats the effect.
(3.4, 4.1)

- f** Finds the first instance of the next character following the cursor on the current line. A count repeats the find.
(5.1)
- g** Unused.
- h** **Left arrow.** Moves the cursor one character to the left. Like the other arrow keys, either **h**, the **left arrow** key, or one of the synonyms (**^H**) has the same effect. On V2 editors, arrow keys on certain kinds of terminals (those which send escape sequence, such as vt52, c100, or hp) cannot be used. A count repeats the effect.
(4.1, 8.5)
- i** Inserts text before the cursor, otherwise like **a**.
(8.2)
- j** **Down arrow.** Moves the cursor one line down in the same column. If the position does not exist, **vi** comes as close as possible to the same column. Synonyms include **^J** (line feed) and **^N**.
- k** **Up arrow.** Moves the cursor one line up. **^P** is a synonym.
- l** **Right arrow.** Moves the cursor one character to the right. **SPACE** is a synonym.
- m** Marks the current position of the cursor in the mark register which is specified by the next character **a-z**. Return to this position or use with an operator using **'** or **'**.
(6.3)
- n** Repeats the last / or ? scanning commands.
(3.2)
- o** Opens new lines below the current line; otherwise like **O**.
(4.1)
- p** Puts text after/below the cursor; otherwise like **P**.
(7.3)
- q** Unused.
- r** Replaces the single character at the cursor with a single character you type. The new character may be a RETURN; this is the easiest way to split lines. A count replaces each of the following count characters with the single character given; see **R** above, which is usually the more useful iteration of **r**.
(4.2)
- s** Changes the single character under the cursor to the text which follows up to an ESC; given a count, that many characters from the current line are changed. The last character to be changed is marked with **\$** as in **c**.
(4.2)
- t** Advances the cursor up to the character before the next character typed. Most useful with operator such as **d** and **c** to delete the characters up to a following character. You can use **.** to delete more if this does not delete enough the first time.
(5.1)
- u** Undoes the last change made to the current buffer. If repeated, will alternate between these two states, thus is its own inverse. When used after an insert which inserted text on more than one line, the lines are saved in the numeric named buffers.
(4.5)
- v** Unused.
- w** Advances to the beginning of the next word, as defined by **b**.
(3.4)

- x** Deletes the single character under the cursor. With a count, deletes that many characters forward from the cursor position, but only on the current line.
(7.5)
- y** An operator which yanks the following object into the unnamed temporary buffer. If preceded by a named buffer specification, "x, the text is placed in that buffer also. Text can be recovered by a later **p** or **P**.
(8.4)
- z** Redraws the screen with the current line placed as specified by the following character:
- RETURN specifies the top of the screen
 - . specifies the center of the screen
 - specifies the bottom of the screen.
- A count may be given after the **z** and before the following character to specify the new screen size for the redraw. A count before the **z** gives the number of the line to place in the center of the screen instead of the default current line.
(5.4)
- {** Retreats to the beginning of the preceding paragraph. A paragraph begins at each macro in the *paragraphs* option, normally **.IP**, **.LP**, **.PP**, **.QP** and **.bp**. A paragraph also begins after a completely empty line, and at each section boundary (see **||**).
(5.2, 7.8, 8.6)
- |** Places the cursor on the character in the column specified by the count.
(8.1, 8.2)
- }** Advances to the beginning of the next paragraph. See **{** for the definition of paragraph.
(5.2, 7.8, 8.6)
- ~** Unused.
- ^?** (DEL) Interrupts the editor, returning it to command-accepting state.
(2.4, 8.5)